CLAIMS

What is claimed is:

1. A minimally invasive reaming assembly for creating an entry portal into the canal of a bone and providing a working channel in which to ream the canal of a bone, the assembly comprising:

a) an elongated cylindrically-shaped hollow sleeve having a proximal and a distal end, the distal end having a plurality of cutting blades;

b) a housing adjacent to the proximal end of the sleeve, the housing having a top portion, a bottom portion and a through bore, the top portion including releaseable engagement means for engagement with an inner reamer;

c) an inner reamer having an elongated body and proximal and distal ends, the distal end having a rotatable reaming head and the proximal end having connecting means for connection to a drill, a portion of the body including engagement means for engagement with the housing, the reamer being sized and shaped for insertion through the bore of the housing and the sleeve;

d) whereas the minimally invasive reaming assembly is configured to create an entry portal into the canal of a bone and to provide a working channel in which a plurality of reamers of graduated sizes are inserted for progressively reaming the canal of a bone.

2. The assembly of claim 1, wherein the housing and sleeve are separate elements in which the bottom portion of the housing includes engagement means for engaging with an engagement means on the proximal end of the sleeve for releaseable attachment of the housing to the sleeve.

3. The assembly of claim 2, wherein the engagement means of the proximal end of the sleeve includes threading for engaging with a threaded portion on a surface of the housing bore and a ring of horizontally placed teeth positioned below the threading on the sleeve.

4. The assembly of claim 3, wherein the engagement means of the bottom portion of the housing further includes a spring loaded locking means for releaseably engaging the horizontally placed teeth on the sleeve after the sleeve has been threaded into the housing.

5. The assembly of claim 1, wherein the engagement means of the top portion of the housing includes a notch sized and shaped for mating with a tab placed on an annular collar of the inner reamer.

6. The assembly of claim 5, wherein the engagement means of the top portion of the housing further includes a spring loaded release means for releasing the tab on the annular collar from the notch of the housing in order to remove the inner reamer from the housing and the sleeve.

7. The assembly of claim 1, wherein the inner reamer elongated body is cannulated.

8. The assembly of claim 1, used in combination with a positioning apparatus configured to locate an entry portal in a patient's bone, the apparatus comprising:

a) an elongated cylindrically-shaped hollow sheath having a proximal end, a distal end, and an upper and lower portion, the upper portion including at least one generally circular opening in the sheath;

b) an elongated handle having a proximal and distal end and a through bore, the distal end including a connecting means for connecting and disconnecting the handle to the sheath;

c) an elongated cylindrically-shaped tube having a proximal and distal end, the distal end having a conical tip with a plurality of openings, the proximal end including an annular collar having a greater diameter than the tube, the tube having a central longitudinal axis;

d) the elongated tube including a plurality of openings at its proximal end, at least one cylindrical hub having a plurality of openings being placed longitudinally between the proximal and distal ends of the elongated tube, the plurality of openings of the proximal end, the at least one hub and the conical tip being aligned along parallel lines that are parallel with the cental longitudinal axis of the tube;

e) the elongated tube being sized and shaped for removable insertion into the hollow sheath and the hollow sheath being sized and shaped for removable insertion of the assembly of claim 1 into the hollow sheath;

f) wherein the combination of the assembly of claim 1 and the positioning apparatus allows for the correct placement of an entry portal into a patient's bone, the cutting of the entry portal into the bone canal and the reaming of the canal through the sleeve.

9. The assembly of claim 8, wherein the housing and sleeve are separate elements in which the bottom portion of the housing includes engagement means for engaging with an engagement means of the proximal end of the sleeve for releaseable attachment of the housing to the sleeve.

10. The assembly of claim 9, wherein the engagement means of the proximal end of the sleeve includes threading for engaging with a threaded portion on a surface of the housing bore and a ring of horizontally placed teeth positioned below the threading on the sleeve.

11. The assembly of claim 10, wherein the engagement means of the bottom portion of the housing further includes a spring loaded locking means for releaseably engaging the horizontally placed teeth on the sleeve after the sleeve has been threaded into the housing.

12. The assembly of claim 8, wherein the engagement means of the top portion of the housing includes a notch sized and shaped for mating with a tab placed an annular collar of the inner reamer.

13. The assembly of claim 12, wherein the engagement means of the top portion of the housing further includes a spring loaded release means for releasing the tab on the annular collar from the notch of the housing in order to remove the inner reamer from the housing and the sleeve.

14. The assembly of claim 8, wherein the sheath includes a plurality of generally circular openings.

15. The assembly of claim 8, wherein the elongated handle is configured to allow for the suction of fluids from the reaming site up through the sleeve and out the bore of handle.

16. A minimally invasive method of creating an entry portal into the canal of a bone and providing a working channel in which to ream the canal of the bone, the method comprising the steps of:

a) locating an entry portal in a bone of a patient;

b) inserting a selected guide pin in the bone at the site of the entry portal;

c) creating a minimally invasive entry portal in the bone with a reaming assembly, with the guide ~~pin~~ acting as a guide for the assembly, the reaming assembly comprising:

i) an elongated cylindrically-shaped hollow sleeve having a proximal and a distal end, the distal end having a plurality of cutting blades;

ii) a housing adjacent to the sleeve, the housing having a top portion, a bottom portion and a through bore, the top portion including releaseable engagement means for engagement with an inner reamer;

iii) an inner reamer having an elongated cannulated body and proximal and distal ends, the distal end having a rotatable reaming head and the proximal end having connecting means for connection to a drill, a portion of the body including engagement means for engagement with the housing, the reamer being sized and shaped for insertion through the bore of the housing and the sleeve;

d) removing the guide pin and the inner reamer from the assembly while leaving the assembly in the entry portal in the bone;

e) inserting selected progressively larger sized reamers through the assembly to ream the canal of the bone to a larger diameter;

f) removing the assembly from the bone upon completion of the canal preparation; and

g) inserting an intramedullary nail into the prepared canal.

17. The method of claim 16, including the steps of:

a) locating the entry portal of the bone with an entry portal tool, the tool comprising:

i) an elongated cylindrically-shaped hollow sheath having a proximal end, a distal end, and an upper and lower portion, the upper portion including at least one generally circular opening in the sheath;

ii) an elongated handle having a proximal and distal end and a through bore, the distal end including a connecting means for connecting and disconnecting the handle to the sheath;

iii) an elongated cylindrically-shaped tube having a proximal and distal end, the distal end having a conical tip with a plurality of openings, the proximal end including an annular collar having a greater diameter than the tube, the tube having a central longitudinal axis;

iv) the elongated tube including a plurality of openings at its proximal end, at least one cylindrical hub having a plurality of openings being placed longitudinally between the proximal and distal ends of the elongated tube, the plurality of openings of the proximal end, the at least one hub and the conical tip being

aligned along parallel lines that are parallel with the cental longitudinal axis of the tube; and

v) the elongated tube being sized and shaped for removable insertion into the hollow sheath and the hollow sheath being sized and shaped for removable insertion of the assembly of claim 15 into the hollow sheath;

b) removing the elongated tube from the sheath; and

c) inserting the reaming assembly into the sheath and over the guide pin inserted into the bone.

18. The method of claim 17, further including the steps of:

a) making an appropriate incision in a patient;

b) inserting the entry portal tool into the incision;

c) placing at least one guide pin through a selected one of the plurality of openings in the elongated tube;

d) evaluating the position of the guide pin with fluoroscopy means; and

e) inserting the at least one guide pin into the bone.

19. The method of claim 16 and 17, further including the step of applying suction to the handle of the entry portal tool in order to suction fluids from a reaming site up through the sleeve and out through the bore of the handle.

20. A minimally invasive reaming assembly for creating an entry portal into the canal of a bone and providing a working channel in which to ream the canal of a bone, the assembly comprising:

a) an elongated cylindrically-shaped hollow sleeve having a proximal and a distal end, the distal end having a plurality of cutting blades;

b) a releaseable engagement means on the proximal end of the sleeve for releaseable engagement with an inner reamer;

c) an inner reamer having an elongated body and proximal and distal ends, the distal end having a rotatable reaming head and the proximal end having connecting means for connection to a drill, a portion of the body including engagement means for engagement with the proximal end of the sleeve, the reamer being sized and shaped for insertion through the bore of the housing and the sleeve;

d) whereas the minimally invasive reaming assembly is configured to create an entry portal into the canal of a bone and to provide a working channel in which a plurality of reamers of graduated sizes are inserted for progressively reaming the canal of a bone.